

CLAIMS

- 1 1. An electronic device with a key comprising:
2 a switch;
3 a first force sensing region, for acquiring a first force value;
4 a second force sensing region, for acquiring a second force value; and
5 a processor, coupled to the switch, the first force sensing region, and the
6 second force sensing region, for determining a selected function for the key based
7 upon the first force value and the second force value when the switch is activated.
- 1 2. An electronic device according to claim 1, wherein the first force sensing
2 region and the second force sensing region comprise:
3 a partially resistive material, which exhibits a force-to-voltage response
4 value.
- 1 3. An electronic device according to claim 1, further comprising:
2 a third force sensing region, for acquiring a third force value upon
3 activation of the switch,
4 wherein the processor is also coupled to the third force sensing region and
5 determines the selected function for the key based upon the first force value, the
6 second force value, and the third force value when the switch is activated.
- 1 4. An electronic device according to claim 3, wherein the selected function is a
2 primary function when the first force value, the second force value, and the third
3 force value are all below a stored threshold value.
- 1 5. An electronic device according to claim 3, wherein the selected function is a
2 secondary function when the first force value exceeds a stored threshold value.

1 6. An electronic device according to claim 5, wherein the selected function is a
2 primary function of entering a character from a group having 0, 1, 2, 3, 4, 5, 6, 7, 8,
3 9, *, and #.

1 7. An electronic device according to claim 1 further comprising:
2 an actuator positioned above the switch, for activating the switch upon
3 receipt of at least a predetermined amount of pressure.

1 8. An electronic device according to claim 7, wherein the actuator comprises:
2 a plunger positioned above the switch.

1 9. An electronic device according to claim 8, wherein the key comprises:
2 a popple dome positioned under the plunger.

1 10. A electronic device according to claim 7, wherein the actuator comprises:
2 a first satellite plunger positioned above the first force sensing region; and
3 a second satellite plunger positioned above the second force sensing region.

1 11. A keypad comprising:
2 a plurality of central switches;
3 one or more satellite force sensing pads located around each of the plurality
4 of central switches; and
5 an actuator for at least one central switch, each actuator having a first side
6 adapted for receiving an externally applied force, and a plurality of contact
7 surfaces on a second side, the plurality of contact surfaces on the second side
8 corresponding to the at least one central switch and one or more associated
9 satellite force sensing pads,
10 wherein the actuator has multiple actuations, each actuation being
11 distinguishable by an evaluation of the forces sensed by the one or more
12 associated satellite force sensing pads.

1 12. A keypad in accordance with claim 11 wherein at least one of the one or
2 more satellite force sensing pads is associated with at least one of the plurality of
3 central switches.

1 13. A keypad in accordance with claim 11 wherein at least one of the one or
2 more satellite force sensing pads is associated with more than one of the plurality
3 of central switches.

1 14. A keypad in accordance with claim 11 wherein each of the satellite force
2 sensing pads is associated with a selection of a different character input.

1 15. A keypad in accordance with claim 11 wherein each of the multiple
2 actuations is associated with a different character input.

1 16. A keypad in accordance with claim 11 wherein the actuator is triangular in
2 shape.

1 17. A keypad in accordance with claim 11 wherein the actuator is quadrilateral
2 in shape.

1 18. A keypad in accordance with claim 11 further comprising a processor
2 coupled to the plurality of central switches and the one or more satellite force
3 sensing pads, wherein the processor is adapted for comparing the forces sensed by
4 the satellite force sensing pads when one of the plurality of central switches is
5 activated and, based at least in part upon the comparison, distinguishing among
6 the multiple actuations.

1 19. A keypad in accordance with claim 11 further comprising:
2 a cover having an opening through which at least some of the first side of
3 the actuator is exposed.

1 20. The keypad in accordance with claim 11 wherein the keypad is used as part
2 of a wireless communication device.

1 21. A keypad in accordance with claim 20 wherein a secondary key press is
2 detected when a one of the plurality of central switches is activated and a
3 maximum difference between the forces sensed by the one or more satellite force
4 sensing pads located around the one of the plurality of central switches is greater
5 than a stored threshold value.

1 22. A keypad in accordance with claim 20 wherein a primary key press is
2 detected when a one of the plurality of central switches is activated and a
3 maximum difference between forces sensed by the one or more satellite force
4 sensing pads located around the one of the plurality of central switches is less than
5 a stored threshold value.

1 23. A keypad in accordance with claim 22 wherein a secondary key press is
2 detected when a one of the plurality of central switches is activated and a
3 maximum difference between the forces sensed by the one or more satellite force
4 sensing pads located around the one of the plurality of central switches is greater
5 than a stored threshold value.

1 24. A keypad in accordance with claim 23 wherein if after one of a primary key
2 press and a secondary key press is detected, a user replaces the detected key press
3 with the other one of the primary key press and the secondary key press, at least
4 one stored threshold value is updated.

1 25. A keypad in accordance with claim 23 wherein, when a primary key press
2 is replaced by a secondary key press, a processor is adapted to reduce at least one
3 of the stored threshold values.

1 26. A keypad in accordance with claim 23 wherein, when a secondary key
2 press is replaced by a primary key press, the processor is adapted to increase at
3 least one of the stored threshold values.

1 27. A keypad in accordance with claim 20 wherein a secondary key press is
2 detected based upon the associated satellite force sensing pad having the greatest
3 force detected when one of the plurality of central switches is activated.

1 28. The keypad in accordance with claim 20 wherein a primary key press is
2 detected based upon the associated satellite force sensing pads having forces
3 detected below a predetermined threshold when one of the plurality of central
4 switches is activated.

1 29. A multi-function key comprising:
2 a switch;
3 a force sensing area; and
4 an actuator positioned above the switch and at least a portion of the force
5 sensing area,
6 wherein upon activation of the switch by the actuator, the force sensing
7 area exhibits a force value that is used to determine a selected function from a
8 plurality of functions.

1 30. The multi-function key in accordance with claim 29 wherein the plurality of
2 functions includes character entry functions.

1 31. A method for operating a multi-function key comprising:
2 activating a switch;
3 measuring a first force value;
4 measuring a second force value; and
5 determining a selected function from a group of functions, which includes a
6 primary function and a plurality of secondary functions, based on the first force
7 value and the second force value.

1 32. A method according to claim 31, wherein the step of determining
2 comprises:
3 selecting a primary function when a difference between the first force value
4 and the second force value is below a predetermined threshold.

1 33. A method according to claim 31, wherein the step of determining
2 comprises:
3 selecting a secondary function when a difference between the first force
4 value and the second force value is above a predetermined threshold.

1 34. A method according to claim 31, wherein the step of determining
2 comprises:
3 selecting a primary function when the first force value and the second force
4 value are below a predetermined threshold.

1 35. A method according to claim 31, wherein the step of determining
2 comprises:
3 selecting a secondary function when the first force value is above a
4 predetermined threshold.

- 1 36. An electronic device with a key comprising:
2 a switch;
3 a first force sensing region, for acquiring a first force value;
4 a second force sensing region, for acquiring a second force value;
5 a third force sensing region, for acquiring a third force value;
6 a fourth force sensing region, for acquiring a fourth force value; and
7 a processor, coupled to the switch, the first force sensing region, the second
8 force sensing region, the third force sensing region, and the fourth force sensing
9 region, for determining a selected function for the key based upon the first force
10 value, the second force value, the third force value, and the fourth force value,
11 when the switch is activated.